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(71) Applicants:
- **Cheng, Chuan-Tien**
  Shulin Chen, Taipei Hsien (TW)
- **Chuang, Wu-Chen**
  Tainan (TW)

(72) Inventor: **Chuang, Wu-Chen**
Tainan (TW)

(74) Representative: **Rottmann, Maximilian R.**
c/o Rottmann, Zimmermann + Partner AG
Glattalstrasse 37
CH-8052 Zürich (CH)

(54) Improvement in the reed frame structure for weaving machine having magnetically-propelled shuttle

(57) A reed frame structure for weaving machine having magnetically-propelled shuttle (24) is disclosed. The weaving machine has a shuttle traction device (23) with a magnet (231) pulling a shuttle with another magnet (241) oriented in an attracting manner with respect to the magnet of the shuttle for carrying a weft thread. The reed frame structure comprising: a shuttle guiding frame (61) having a generally hollow tubed structure with a formed shuttle traction channel (311) for housing the shuttle traction device (23) and allowing the shuttle traction device (23) to move back and forth therein; a reed (12) installed along one side of the shuttle guiding frame (61) having a number of parallel steel wires allowing a number of warp threads (34,35) passing therebetween; a pair of shuttle guiderails (13) each secured at one side of the shuttle traction channel (311) of the shuttle guiding frame (61), each of the shuttle guide rails (13) having a number of spacer plates (131) extending upright from the rail, whereby every consecutive two of the spacer plates (131) forming a spacer groove (132) for receiving respective ones of the warp threads (34,35). The reed frame structure further comprises a long and thin shuttle traction channel cover panel (5) installed on top of the shuttle guide rails for covering the shuttle traction channel, (311), in order to protect against intrusion of foreign objects therein.

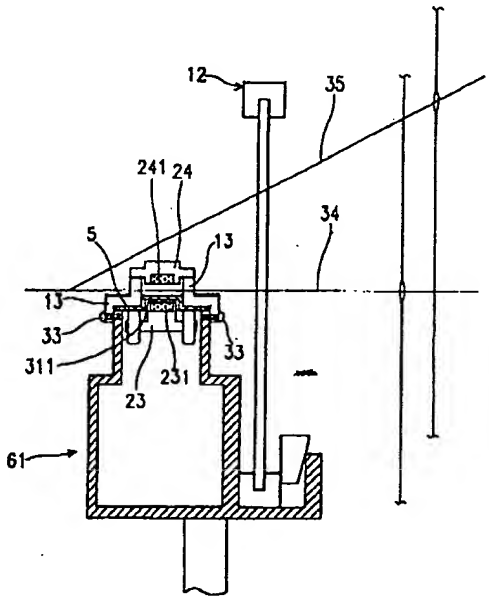

FIG. 4

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates in general to the reed frame structure of weaving machines having magnetically-propelled shuttle. In particular, the present invention relates to reed frame structure of weaving machine having protective covering for the travel channel of the shuttle traction device while maintaining sufficient traction force to the shuttle for stable operation.

Technical Background

Conventional weaving machines utilizing magnetically-propelled shuttle employ shuttle traction devices installed in the open channel to allow for the sufficient attractive force between the shuttle and the shuttle traction device by maintaining minimized distance therebetween. However, the exposed open channel where the shuttle and shuttle traction device travel together rapidly back and forth is subjected to the intrusion of foreign objects that might obstruct the travel of the shuttle and/or the shuttle traction device. For example, the accumulation of fibers falling apart from the threads as a result of the weaving operation may eventually obstruct the smooth motion of the shuttle traction device. Or, in come occasions, if certain hard or large objects much as screws or other tools are lost and forgotten in the channel during maintenance, damages may well result to the shuttle traction device and/or other related components when the machine is later started.

FIGS. 1 and 2 of the accompanying drawing of the present invention shows respectively the perspective and cross-sectional view of the reed frame of a conventional weaving machine having magnetically-propelled shuttle. The reed frame 1 of a typical magnetically-propelled-shuttle weaving machine comprises a shuttle guiding frame 11, a reed 12, and a pair of shuttle guide rails 13. The shuttle guiding frame 11 is a generally hollow tubed structure to house the shuttle traction device 23 internally, and the reed 12 is typically installed along one side at the shuttle guiding frame 11, while the pair of shuttle guide rails 13 are fixed to the top of the shuttle guiding frame 11 to form a shuttle travel channel that a shuttle 24 can be pulled and travels back and forth therein.

The reed 12 is typically comprised of a number of parallel steel wires 121, allowing the upper and lower warp threads 35 and 34 to pass between the steel wires 121. Each of the shuttle guide rails 13 may have a number of upright spacer plates 131 forming a number of spacer grooves 132 between every two consecutive spacer plates 131. The spacer grooves 132 are utilized to contain the lower warp threads 34 during weaving.

The shuttle 24 is placed in the guided travel channel formed between the pair of shuttle guide rails 13 on top of the tube-shaped shuttle guiding frame 11. The shuttle 24 is incorporated with a magnet 241 that can be attracted by another magnet 231 secured to the shuttle traction devices 23. The pair of magnets 241 and 132 installed on the shuttle 24 and the shuttle traction device 23 respectively are arranged in a position with reverse magnetic polarity facing each other, so that the each of the pair of magnets attracts the other. The shuttle traction device 23 can thus drive the shuttle 24 to move back and forth along the shuttle travel channel, allowing the shuttle 24 to lead the weft thread properly through the upper and lower warp threads 35 and 34 to weave the fabric accordingly.

The shuttle 24 should be moving at a highest possible speed during the weaving operation along the shuttle travel channel. Since the shuttle 24 is traveling in both directions, it is subjected to acceleration and deceleration when the direction of travel changes. To prevent the shuttle 24 from breaking loose from the magnetic attraction of the shuttle traction device 23, the distance between the shuttle 24 and the shuttle traction device 23 must be maintained as close to each other as possible. This is one of the most important controlling issues over the shuttle in a magnetically-propelled shuttle weaving machine.

In order to reduce the situation wherein the shuttle breaks loose from the magnetic attraction and flies out of control of the shuttle traction device, an improvement over the conventional reed frame structure for weaving machines employing magnetically-propelled shuttles was disclosed in the Chinese Patent No. 20029. FIG. 3 of the drawing depicts the cross-sectional view of the reed frame structure of that Chinese patent weaving machine.

As is observed in the drawing, the shuttle guiding frame 31 of the Chinese patent has an exposed shuttle travel. channel 311 cut through the top surface of its tube-shaped frame structure 31. The shuttle traction device 23 can extend its very top portion into this channel 311 to further approach to the shuttle 24 than in the case of the conventional weaving machine of FIG 2. As is obvious, the magnetic force between two magnets is inversely proportional to the square of the distance between the magnets. A shorter distance between the magnet 241 of the shuttle 24 and the magnet 231 of the shuttle traction device 23 directly results in the increase of the attraction force therebetween.

However, the weaving machine as disclosed in the Chinese Patent No. 20029 still faces the problem of exposing shuttle traction device to foreign objects. In particular, when the weaving machine is handling threads of short fibers, the massive accumulation of the fibers in the exposed shuttle travel channel 311 in relatively short time period is an obvious problem for such machines.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide an improvement in the reed frame structure for

weaving machine having magnetically-propelled shuttle that can prevent intrusion of foreign objects in the channel where the shuttle traction device travels.

It is another object of the present invention to provide an improvement in the reed frame structure for weaving machine having magnetically-propelled shuttle that allows for the prevention of foreign object intrusion in the shuttle traction device's travel channel while simultaneously provides sufficient attraction force between the shuttle and shuttle traction device.

The present invention achieves the above-identified objects by providing a reed frame structure for weaving machine having magnetically-propelled shuttle. The weaving machine has a shuttle traction device with a magnet pulling a shuttle with another magnet oriented in an attracting manner for carrying a weft thread. The reed frame structure comprises: a shuttle guiding frame having a generally hollow tubed structure with a formed shuttle traction channel for housing the shuttle traction device and allowing the shuttle traction device to move back and forth therein; a reed installed along one side of the shuttle guiding frame having a number of parallel steel wires allowing a number of warp threads passing therebetween; and a pair of shuttle guide rails each positioned at one side of the shuttle travel channel and on the top surface of the shuttle guiding frame, each of the shuttle guide rails having a number of spacer plates extending upright from the rail, whereby every consecutive two of the spacer plates forming a spacer groove for receiving respective ones of the warp threads. The reed frame structure further comprises a long and thin shuttle traction channel cover panel installed on top of the shuttle guide rails for covering the shuttle traction channel. The shuttle traction channel cover panel serves to protect against intrusion of foreign objects into the channel.

BRIEF DESCRIPTION OF THE DRAWING

Other objects, features and advantages of the present invention will become apparent by way of the following detailed description of the preferred but non-limiting embodiment. The description is made with reference to the accompanied drawings, wherein:

FIG. 1 is a perspective view of the reed frame structure of a conventional weaving machine having magnetically-propelled shuttle;

FIG. 2 is a cross-sectional view of the reed frame structure of the conventional weaving machine of FIG. 1;

FIG. 3 is a cross-sectional view of the reed frame structure of another conventional weaving machine;

FIG. 4 is a cross-sectional view of the reed frame structure of the weaving machine having magnetically-propelled shuttle in accordance with a first preferred embodiment of the present invention;

FIG. 5 is a perspective view of a shuttle traction channel cover panel for the reed frame structure of the weaving machine of the first embodiment of the present invention;

FIG. 6 is a cross-sectional view of the reed frame structure of the weaving machine having magnetically-propelled shuttle in accordance with a second preferred embodiment of the present invention; and

FIG. 7 is a perspective view of the shuttle traction channel cover panel for the reed frame structure of the weaving machine of the second embodiment or the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Refer to FIG. 4, in which is shown a cross-sectional view of the reed frame structure of the weaving machine having magnetically-propelled shuttle in accordance with a first preferred embodiment of the present invention. The reed frame structure of the first embodiment of the present invention comprises the shuttle guiding frame 61, the reed 12, and the pair of shuttle guide rails 13. The shuttle guiding frame 61, with its top surface cut open and forming a shuttle travel channel 311, is a generally hollow tubed structure to house the shuttle traction device 23 internally, and the reed 12 is installed along one side of the shuttle guiding frame 61, while the pair of shuttle guide rails 13 are fixed to the top of the shuttle guiding frame 61 to form a shuttle travel channel that a shuttle 24 can be pulled to travel back and forth therein.

A thin plate of shuttle traction channel cover panel 5 is placed on top of the shuttle guiding frame 61 and is pressed at its both sides under the pair of shuttle guide rails 13. The thin plate of shuttle traction channel cover panel 5 covers the entire length of the shuttle travel channel 311. As is seen in FIG. 5, the perspective view of the shuttle traction channel cover panel 5, the panel 5 is made from a thin plate to form a recessed channel 51 with two flanges 52 extending at both sides of the panel 5.

When reference is made again to FIG. 4, it can be observed that the recessed channel 51 of the shuttle traction channel cover panel 5 is provided for receiving the top portion of the shuttle traction device 23. With the two shuttle guide rails 13 having their bottom surfaces sitting on the flanges 52 of the shuttle traction channel cover panel 5 and securing to the shuttle guiding frame 61 by a number of screws 33, the arrangement allows for the close approximation of the magnet 231 of the shuttle traction device 23 to the magnet 241 of the shuttle 24. Although the shuttle traction channel cover panel 5 is placed between the two magnets 241 and 231, the thin thickness of the panel 5 adds little to the distance therebetween.

As is in the case of the conventional weaving machine of FIG. 1, each of the pair of shuttle guide rails 13 may also be prepared with a number of upright spacer plates 131 forming a number of spacer grooves 132 between every two consecutive spacer plates 131. The

spacer plates and grooves 131 and 132 allows for containing the lower warp threads 34 during weaving.

The shuttle 24, having its wings riding on top of the shuttle guide rails 13 and carrying the weft thread, can be pulled by the shuttle traction device 23 utilizing the magnetic force between the magnets 241 and 231 in the shuttle 24 and the shuttle traction device 23 respectively. The shuttle traction channel cover panel 5 provides for the protection against the intrusion of foreign objects, in particular the thread fibers, into the channel in which the shuttle traction device 23 moves back and forth.

Refer to FIG. 6, in which is shown a cross-sectional view of the reed frame structure of the weaving machine having magnetically-propelled shuttle in accordance with a second preferred embodiment of the present invention. When compared to the first embodiment of the present invention as shown in FIG. 4, the second embodiment shown in the drawing has a different type of shuttle traction channel cover panel 7 replacing the panel 5 of FIG. 4.

Reference should be made to FIG. 7 simultaneously with FIG. 6 of the drawing. FIG. 7 shows the perspective view of the shuttle traction channel cover panel 7 for the reed frame structure of the weaving machine of the second embodiment of the present invention.

The shuttle traction channel cover panel 7 is generally a long and thin flat plate having two rows of openings 71 thereon. The openings 71 are provided to receive the two rows of spacer plates 131 of the two shuttle guide rails 13 when the shuttle traction channel cover panel 7 is placed in position on top of the shuttle guiding frame 31. With the openings 71 receiving the passing through of the spacer plates 131, the panel 7 can tightly cover the shuttle traction device's travel channel for the protection against the intrusion of foreign objects therein. As was in the case of the first embodiment of the present invention shown in FIG. 4, the thin thickness of the shuttle traction channel cover panel 7 adds little to the distance between the magnets 241 and 231 of the shuttle 24 and the shuttle traction device 23 respectively.

The above-described embodiments are utilized only for the purpose of the description of the present invention. Persons skilled in this art can appreciate the fact that other similar arrangements can be devised from the embodiments disclosed above without departing from the spirit of the present invention, which is recited in the claims that follows.

Claims

1. A reed frame structure for weaving machine having magnetically-propelled weaving machine having a shuttle traction device with a first magnet pulling a shuttle with a second magnet oriented in an attracting manner with respect to said first magnet for carrying a weft thread, said reed frame structure comprising:

   a shuttle guiding frame having a generally hollow tubed structure with a formed shuttle traction channel for housing said shuttle traction device and allowing said shuttle traction device to move back and forth therein;

   a reed installed along one side of said shuttle guiding frame having a plurality of parallel steel wires allowing a plurality of warp threads passing therebetween;

   a pair of shuttle guide rails each positioned at one side of said shuttle travel channel and on the top surface of said shuttle guiding frame, each of said shuttle guide rails having a plurality of spacer plates extending upright from said rail, whereby every consecutive two of said spacer plates forming a spacer groove for receiving respective ones or said warp threads; and

   a long and thin shuttle traction channel cover panel installed on top of said shuttle guide rails for covering said shuttle traction channel.

2. The reed frame structure of claim 1, wherein said long and thin shuttle traction channel cover panel comprising a recessed portion and two flanges extending from both sides, said recessed channel receiving said shuttle traction device when said shuttle traction channel cover panel is installed on top of said shuttle guide rails.

3. The reed frame structure of claim 1, wherein said long and thin shuttle traction channel cover panel comprising a generally flat plate having two rows of openings for receiving said spacer plates when said shuttle traction channel cover panel is installed on top of said shuttle guide rails.

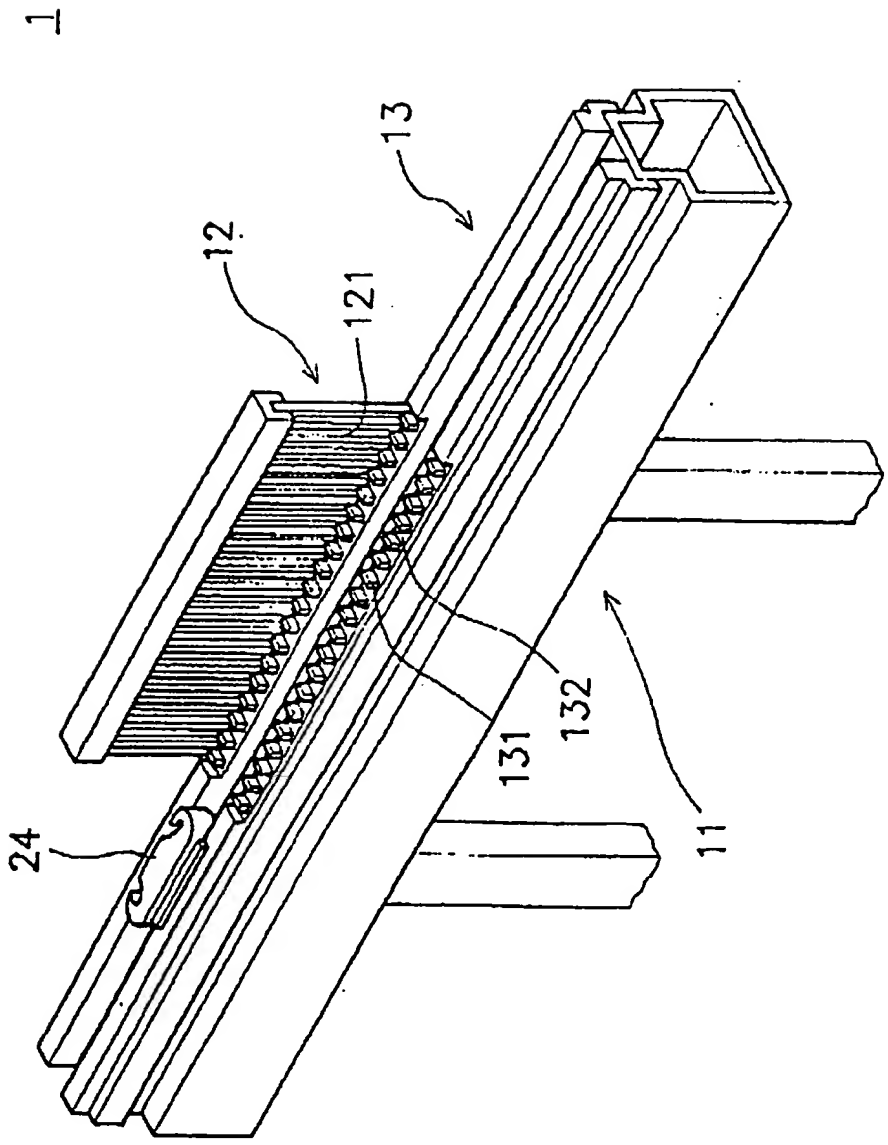

FIG. 1

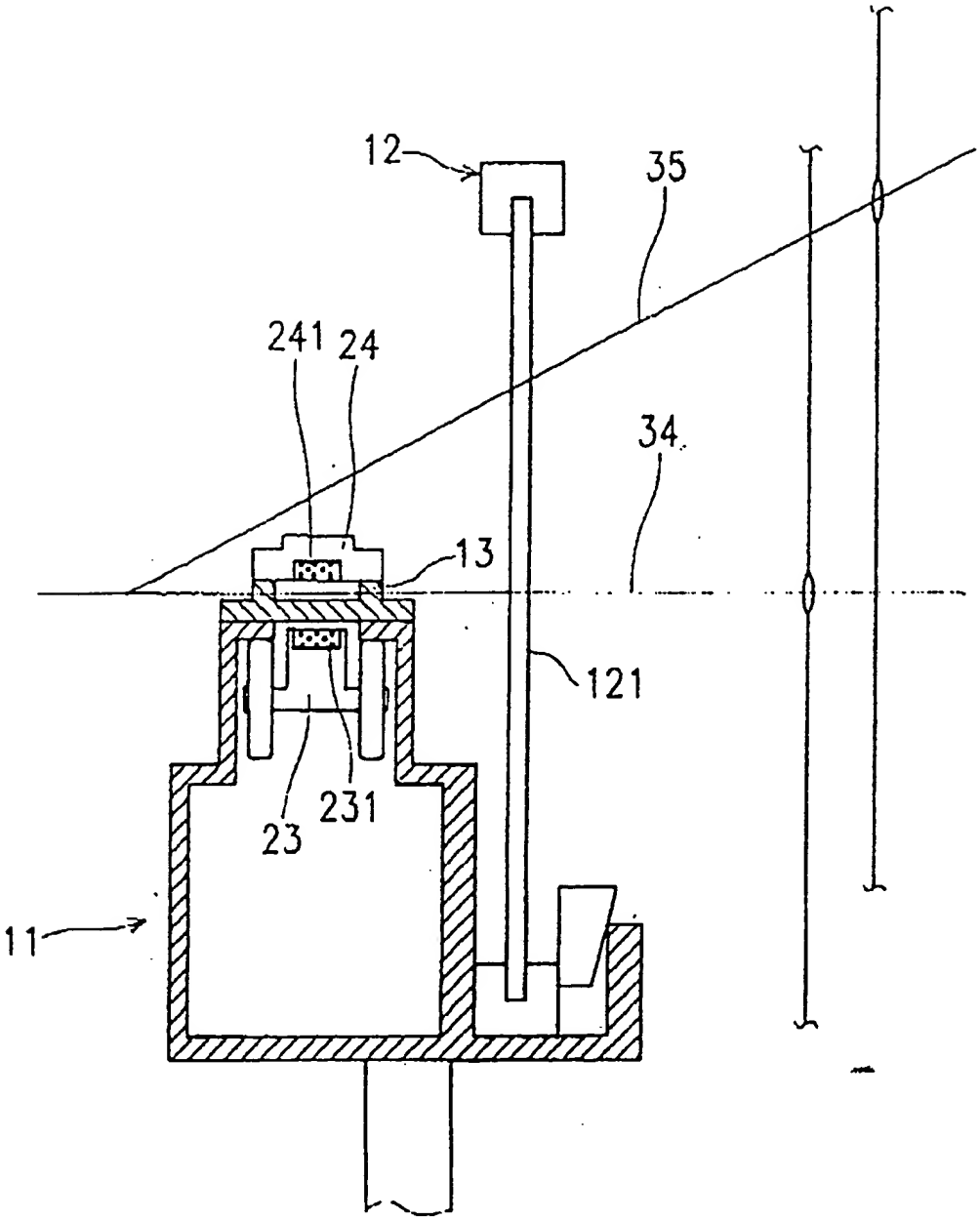

FIG. 2

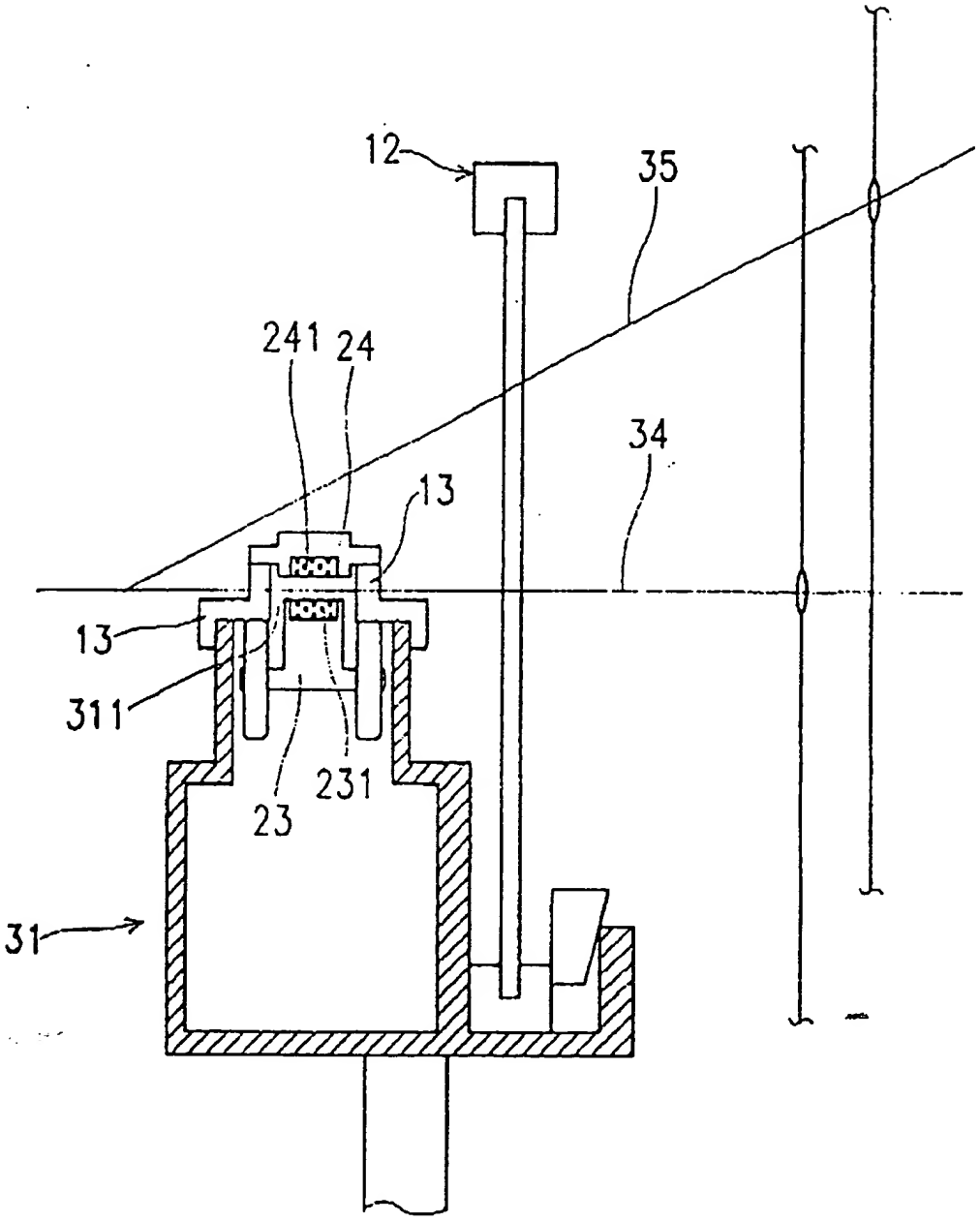

FIG. 3

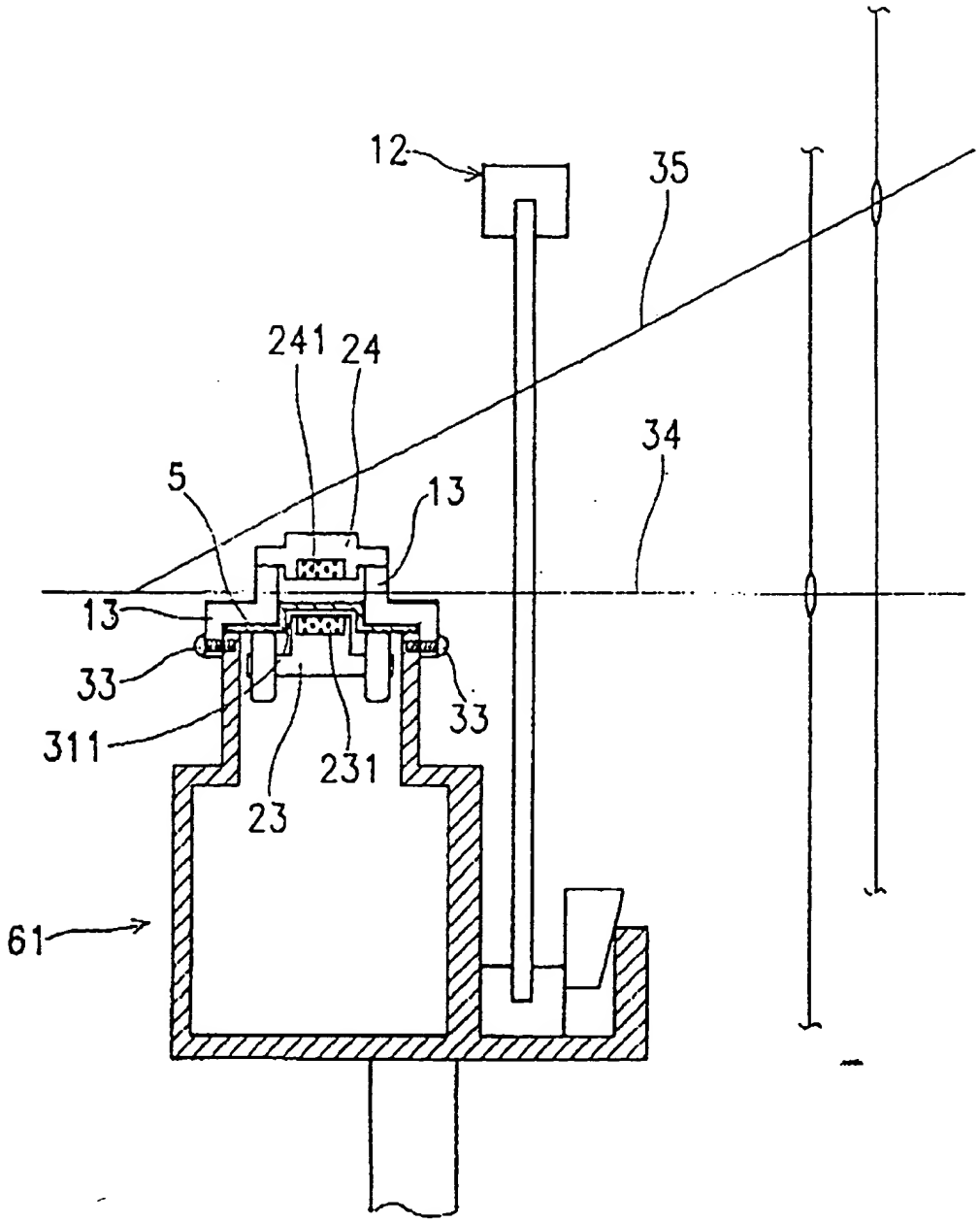

FIG. 4

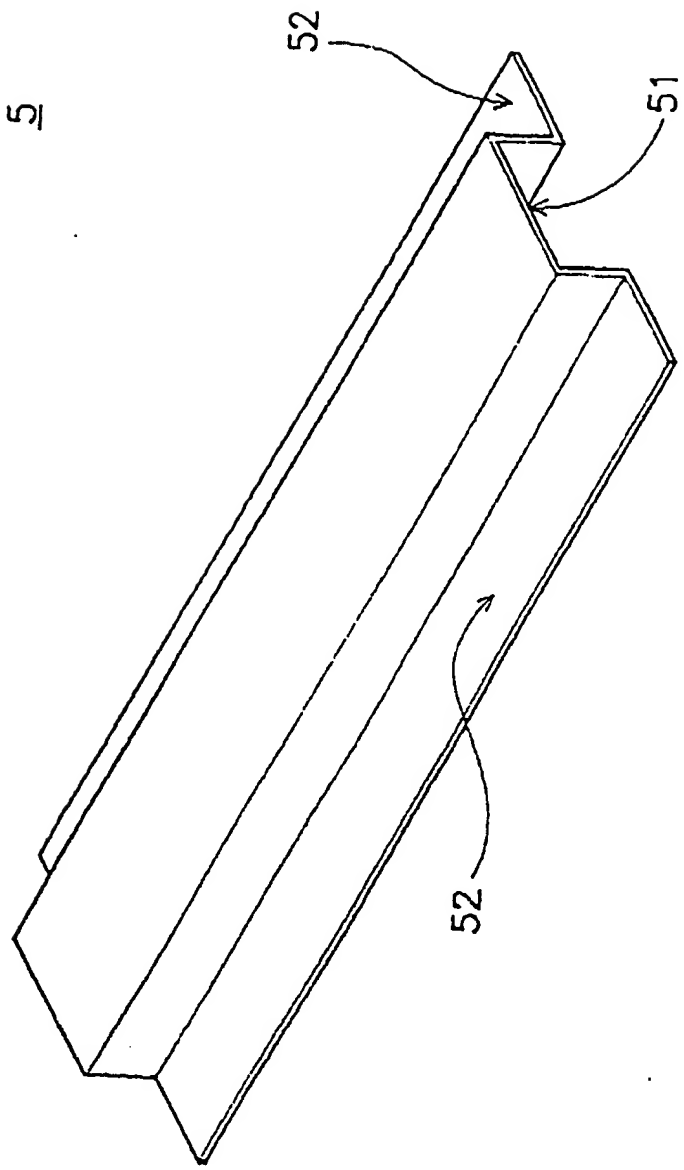

FIG. 5

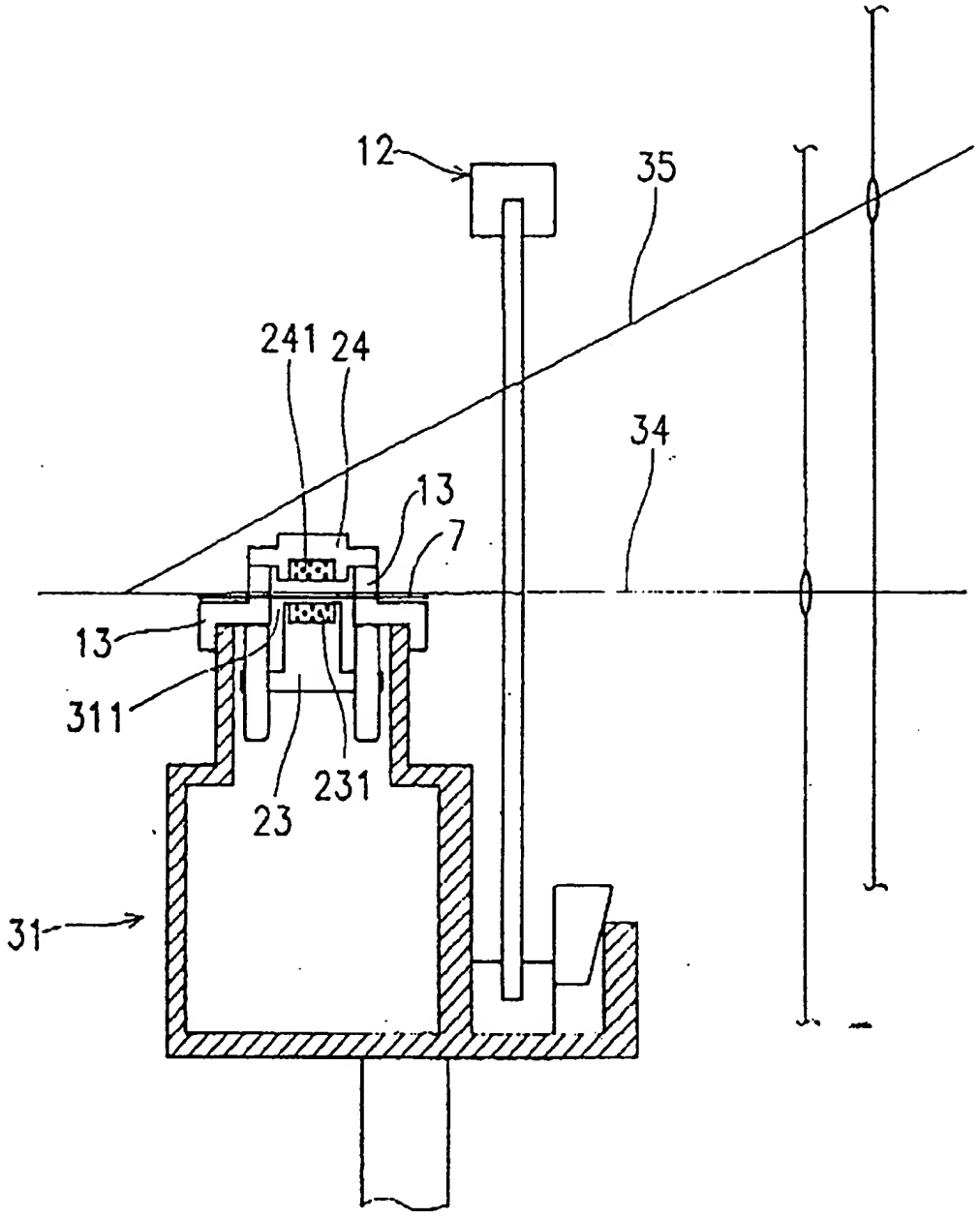

FIG. 6

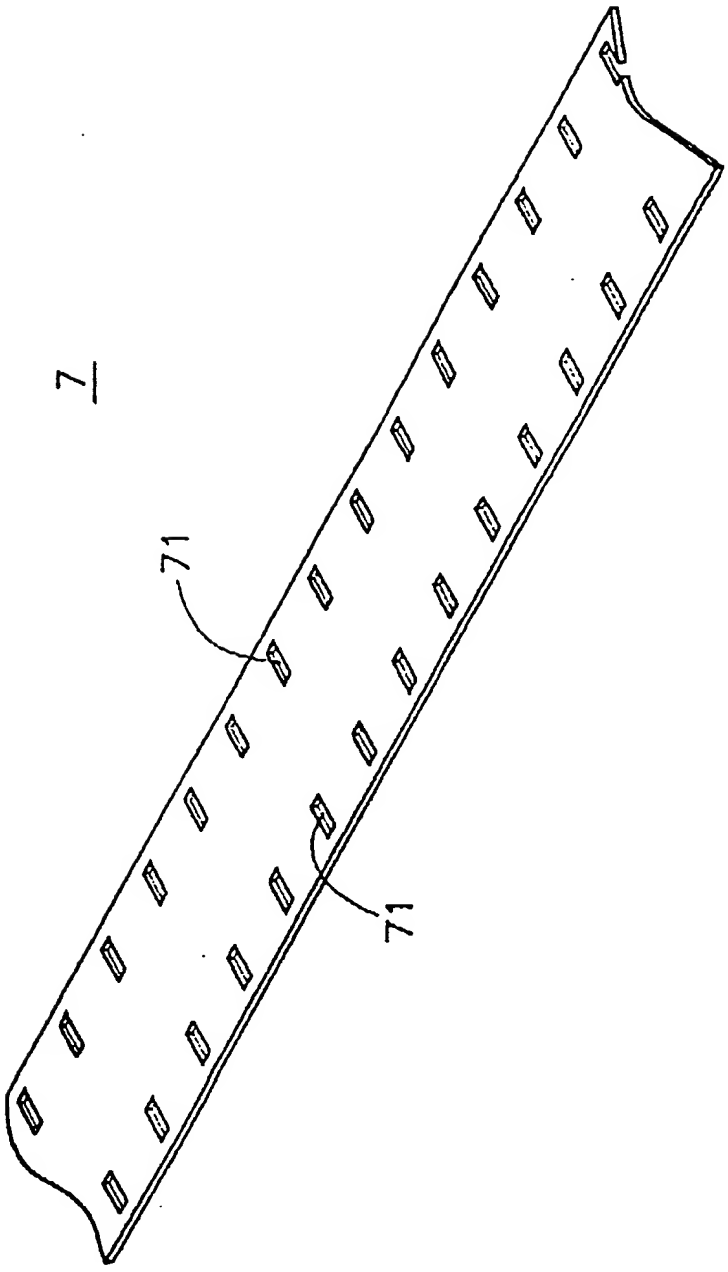

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 94 11 7340

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	GB-A-2 240 991 (HUANG CHI SHUANG) * claim 1; figures 1-3 *	1	D03D1/00 D03D49/44 D03D49/66
Y	FR-A-2 128 661 (QUATTROCOLO) * page 2, line 39 - page 3, line 16; figures 1,2,7 * * page 4, line 11 - line 21 *	1	
Y	US-A-4 901 768 (CHI-SHUANG HUANG) * figures 1-4 *	1	
Y	DE-C-908 240 (BECHÉ) * page 2, line 31 - line 61; figures 1,2 *	1	
A	GB-A-2 240 992 (HUANG CHI SHUANG)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
D03D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 February 1995	Boutelegier, C

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